Genetic resources of field pea in Serbia

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Annual Forage Legumes Collection

The development of new cultivars is impossible to imagine without wide genetic variability for various agronomic characteristics. For that reason, work on field pea (Pisum sativum L.) genetic resources in the Institute of Field and Vegetable Crops, the only Serbian institution involved in field pea breeding, has always had a special place in all its activities.

The field pea breeding program in Novi Sad began immediately after its establishment in 1938. The first field pea collection contained 80 winter lines and 7 spring lines (1). Unfortunately, due to the devastating effects of World War II, the origin these accessions remained uncertain, although there is enough basis to consider that the majority of them were old cultivars from neighbouring countries and local landraces from the Kingdom of Yugoslavia. In the years that followed, the number of accesions changed rather often. The collection was enriched with new accessions by sporadic exchanges with similar institutions from within the country and abroad, while many accessions were lost.

During the 1990'S, there was a significant increase in the number of new accessions of field pea and other grain legumes, as well as the establishment of the Annual Forage Legumes Collection in Novi Sad (AFLCNS) in 2001 (2), with about 2200 accessions from 67 species and 16 genera.

Apart from the field pea collection in Novi Sad, there are two more pea collections in Serbia, both of vegetable pea, with one maintained in the Vegetable Crops Department of the Institute of Field and Vegetable Crops in Novi Sad and another maintained at the Institute for Vegetable Crops in Smederevska Palanka (3).

Table 1. The taxa structure of the Novi Sad field pea collection.

Taxon	Number of accessions
Pisum abyssinicum A. Br.	15
Pisum fulvum Sm.	13
Pisum sativum L. subsp. elatius (Steven ex M. Bieb.) Asch. & Graebn.	18
Pisum sativum L. subsp. elatius var. pumilio Meikle	2
Pisum sativum L. subsp. sativum, with var. arvense (L.) Poir. and var. sativum)	631
Pisum syriacum Berger	12
Total	691

Structure

The field pea collection is the second largest unit of AFLCNS, following the Vicia collection. In mid-2009 it comprised nearly 700 accessions (Table 1).

The field pea collection in the Institute of Field and Vegetable Crops contains the accessions of various status (Table 2).

Table 2. Agronomic status of accessions in the Novi Sad field pea collection.

Status	Number of accessions
Wild	78
Weedy	5
Traditional cultivars/landraces	74
Breeders lines	127
Advanced cultivars	365
Genetic stock	42
Total	691

The accessions of the field pea collection in Novi Sad originate from nearly all European countries, as well as

from a majority of the countries belonging to the temperate regions of other continents.

Passport database

The development of an AFLCNS Passport Database was critical for use of the collection. The AFLCNS Passport Database has been constructed as a Microsoft Excel file, regularly updated and freely available upon request (Aleksandar Mikic, mikic@ifvcns.ns.ac.rs). It is likely that the AFGLC Passport Database will be transformed into an easily accessible and fully searchable web site in the near future.

According to the Grain Legume Passport Descriptors (4), AFGLC Passport Database offers the following nineteen information points on each accession: institute code, accession number, collecting number, genus, species, subspecies, accession name, country of origin, location of collecting site, latitude of collecting site, longitude of collecting site, elevation of collecting site, collecting date of original sample, status of sample, collecting source, donor institute code, donor number, other number(s) associated with the accession, and remarks.

Characterization and evaluation

Each new accession is characterized by describing the traits that are highly heritable and do not depend on environmental conditions to a great extent, such as seed shape, seed coat color, cotyledon color, flower color, as well as stem fasciation and leaf type.

In case an accession is successfully regenerated and characterized, its seed is multiplied as long as needed in order to produce enough seed to include it into diverse trials and to evaluate it from diverse aspects. From the point of view of breeding, the highest priority is placed on a long-term evaluation of the field pea accessions for forage and grain yield including forage and grain yield components, as well as for chemical composition of both forage and grain, with an emphasis on crude protein content. Another important aspect of the evaluation of field pea accessions is resistance to biotic and abiotic stress, such as diseases, pests, low temperature and drought. Each AFLC accession is expected to be evaluated for each of the characteristics mentioned for a minimum of three successive years.

Future

Two primary activities that shall be continued in the future include further expansion of the Novi Sad field pea collection with new accessions, especially by collecting and developing new genetic populations, and progress in seed maintenance by both improving the storage conditions and development of a duplicate or back up storage site.

Broadening the knowledge on each accession, through passport database development, characterization and evaluation should lead to the development of an AFLCNS core collection, representing the genetic diversity of its species for breeding and other research.

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